

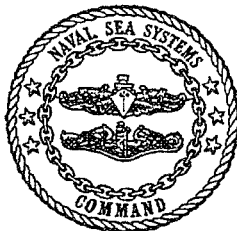
SE110-BK-MMO-010

0910-LP-275-8100

SE110-BK-MMO-01B

TECHNICAL MANUAL FOR

INSPECTION, REPAIR, AND PAINTING FIBERGLASS MAST ASSEMBLIES



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30 JUN 1990

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NAVSEA TECHNICAL MANUAL
CHANGE GUIDE

TM Change Number: SE110-BK-MMO-01A

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Total number of pages in this publication is 63 consisting of the following:

Page No.	*Change No.	Page No.	*Change No.
Title and A	B	CHAPTER 5	
Change Guide and Certification Sheet	B	5-1	0
Change Guide and Certification Sheet	A	5-2 blank	0
#Certification Sheet	0		
Change Record	0	CHAPTER 6	
Change Record blank	0	6-1 and 6-2	A
Foreword-1	A	6-3 through 6-8	0
Foreword-2 blank	0	6-9	A
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v through vii	0	CHAPTER 7	
viii	B	7-1 and 7-2	0
CHAPTER 1		CHAPTER 8	
1-1	B	8-1 through 8-8	B
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2-1	0	9-2 blank	0
2-2 blank	0		
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3-2 blank	0		
		CHAPTER 11	
CHAPTER 4		11-1 through 11-3	0
4-1 through 4-3	0	11-4 blank	0
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A Change B

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NAVSEA TECHNICAL MANUAL CERTIFICATION SHEET

Certification Applies to: Change B

Applicable TMINs/Change No.: SE110-BK-MMO-01B

Publication Date: 15 MARCH 2001

Title: TECHNICAL MANUAL FOR INSPECTION, REPAIR, AND PAINTING, FIBERGLASS MAST ASSEMBLIES

TMCR: NDMS 980115-000


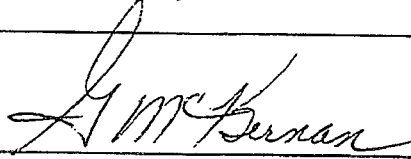

PURPOSE OF CHANGE: To delete the camouflage painting requirement for submarine masts from chapter 8.

Equipment Alteration Numbers Incorporated: N/A

TMDER/ACN Numbers Incorporated: A49069 (ACN 1/A), N65540-00-RD01

CERTIFICATION STATEMENT

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Authority	Name	Signature	Organization	Date
Acquisition	T. Colville, Project Engineer Feedback Support Section DSN 443-1227 or Comm. (215) 897-1227		NSWCCD-SSES 9441	3/7/01
Technical	G. McKernan Head, Feedback Support Section		NSWCCD-SSES 9441	4-25-01
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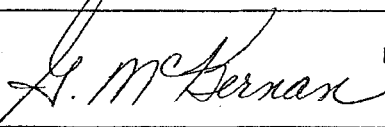
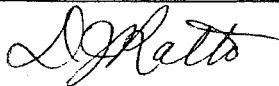
PURPOSE OF CHANGE: To replace reference to form DD-1694 with Departure From Specifications Form. Fill in applicable blocks on form 4160/1.

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TMDER/ACN Numbers Incorporated: NSWCCD-SSES FB T-14236

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PURPOSE OF REVISION : To reflect changes in the type of paint and painting procedures.

Equipment Alteration Numbers Incorporated : N/A

TMDER / ACN Numbers Incorporated : N/A

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Authority	Name	Signature	Organization	Date
Acquisition	E. Gormley, Head, Shipbuilding Support Section	<i>Robert J. Waldner</i> for	NAVSESSES 083D	4 JAN 91
Technical	P. Manceri Director, Submarine Antenna Department	<i>J. H. Hamilton</i>	NAVSESSES 06	12/28/90
Printing Release	M. Cohen Head, Technical Manual Branch	<i>M. Cohen</i>	NAVSESSES 083	4 JAN 91

CHANGE RECORD

Change No.	Date	Title and/or Brief Description	Signature of Validating Officer

Change Record/(Change Record blank)

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SAFETY SUMMARY

GENERAL SAFETY NOTICES

The following general safety notices supplement the specific warnings and cautions appearing elsewhere in this manual. They are recommended precautions that must be understood and applied during operation and maintenance of the equipment covered herein. If situations arise that are not covered in the general or specific safety precautions, the Commanding Officer or other authority will issue orders as deemed necessary to cover the situation.

DO NOT REPAIR OR ADJUST ALONE

Under no circumstances should repair or adjustment of energized equipment be attempted alone. The immediate presence of someone capable of rendering aid is required. Before making adjustments, be sure to protect against grounding. If possible, adjustments should be made with one hand, with the other hand free and clear of equipment. Even when power has been removed from equipment circuits, dangerous potentials may still exist due to retention of charges by capacitors. Circuits must be grounded and all capacitors discharged prior to attempting repairs.

TEST EQUIPMENT

Make certain test equipment is in good condition. If a test meter must be held, ground the case of the meter before starting measurement; do not touch live equipment or personnel working on live equipment while holding a test meter. Some types of measuring devices should not be grounded; such devices should not be held when taking measurements.

INTERLOCKS

Interlocks are provided for safety of personnel and equipment and should be used only for the purpose intended. They should not be battle-shortened or otherwise modified except by authorized maintenance personnel. Do not depend solely upon interlocks for protection. Whenever possible, disconnect power at power distribution source.

MOVING EQUIPMENT

Personnel shall remain clear of moving equipment. If equipment requires adjustment while in motion, a safety watch shall be posted. The safety watch shall have a full view of operations being performed, and immediate access to controls capable of stopping equipment motion.

FIRST AID

An injury, no matter how slight, shall never go unattended. Always obtain first aid or medical attention immediately.

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SAFETY SUMMARY - (Continued)

RESUSCITATION

Personnel working with or near high voltage shall be familiar with approved methods of resuscitation. If someone is injured and stops breathing, initiate resuscitation immediately. A delay could cost the victim's life.

GENERAL PRECAUTIONS

The following general precautions are to be observed at all times.

1. Install and ground all electrical components associated with this system/equipment in accordance with applicable Navy regulations and approved shipboard practices.
2. Ensure that all maintenance operations comply with Navy Safety Precautions, OPNAVINST 5100 series.
3. Observe precautions set forth in Naval Ships' Technical Manual (NSTM) chapters 300, 302, 310 and 320 with respect to electrical equipment and circuits.
4. Ensure that protective guards and shutdown devices are properly installed and maintained around rotating parts of machinery and high voltage sources.
5. Do not wear loose clothing while working around rotating parts of machinery.
6. Ensure that special precautionary measures are employed to prevent applying power to the system/equipment at any time maintenance work is in progress.
7. Do not make any unauthorized alterations to equipment or components.
8. Before working on electrical systems/equipment, check with voltmeter to ensure that system is not energized.
9. Consider all circuits, not known to be "dead", "live" and dangerous at all times.
10. When working near electricity, do not use metal rules, flashlights, metallic pencils, or any other objects having exposed conducting material.
11. Deenergize all equipment before connecting or disconnecting meters or test leads.
12. When connecting a meter to terminals for measurement, use range higher than expected voltage.
13. Before operating equipment or performing any tests or measurements, ensure that frames of all motors and starter panels are securely grounded.

SAFETY SUMMARY - (Continued)

14. Ensure that area is well-ventilated when using cleaning solvent. Avoid prolonged breathing of fumes and solvent contact with skin or eyes.

WARNINGS AND CAUTIONS

Specific warnings and cautions applying to the system/equipment covered by this manual are summarized below. These warnings and cautions appear elsewhere in the manual following paragraph headings and immediately preceding the text to which they apply. They are repeated here for emphasis.

CAUTION

When TRIDENT OE-207/BR antenna faired mast assemblies require refinishing, damaged paint coatings shall be removed by carefully controlled sanding only.

Do not scrape old paint coatings from TRIDENT OE-207/BR antenna faired mast assemblies as damage to fiberglass layers will result. (Pages 5-1, 6-2)

CAUTION

Do not heat the faired mast to a temperature in excess of 160° F. (Page 6-3)

CAUTION

Application of excess force with the Squeegee may result in a resin starved area. (Page 6-8)

CAUTION

When sail area heating is required, do not locate the heat source in the vicinity of the mast hoist cylinders. A maximum sail temperature increase of 50° F is permitted when masts are fully raised and hull stop valves are shut. (Page 6-9)

CAUTION

To retain proper clearances between bearing shoes and mast surface, the contour of the faired mast must be maintained during repair in bearing areas. (Page 6-11)

CAUTION

Do not leave excess sealer on bearing surfaces. Internal after bearing surfaces should not be sealed. (Page 6-12)

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SAFETY SUMMARY - (Continued)

CAUTION

Do not attempt to use the mixture beyond limits shown. (Page 8-2)

CAUTION

One spray coating (medium) is approximately 1.5 mils thick wet. Care should be exercised to ensure that the finished mast, radome, or inner mast outer diameter is not oversized. (Page 8-3)

CHAPTER 1 GENERAL INFORMATION

1-1 INTRODUCTION

1-1.1 PURPOSE. The purpose of this document is to provide a procedure for the inspection, repair, and painting of the following mast assembly components:

- a. Closure caps (radome and faired mast)
- b. Radomes
- c. Inner Masts
- d. Faired Masts

1-1.2 SCOPE. This document defines the requirements and procedures for inspecting, repairing, and painting the above components.

1-1.3 APPLICABILITY. This procedure is applicable to submarine radome and faired mast closure caps, radomes, inner masts, and faired masts manufactured from fiberglass. The materials and procedures specified in this document must be strictly adhered to for repairing and painting these items.

1-2 REFERENCES

1-2.1 Military Specifications, NAVSEA Technical Manuals, and NAVSHIPS Drawings.

- a. NAVSHIPS DWG 4398614, Lifting Clamps and Slings for Antenna Masts and Periscopes.
- b. NAVSEA DWG 906-5361738, AN/BRD-7, AN/BLD-1 Lifting Rig Assembly and Details.
- c. NAVSEA SE110-B3-MMA-010 Safety Requirements for Attaching Lifting, Backup, Safety Clamps and Slings to Submarine Antenna Masts and Periscopes.
- d. MIL-P-24441 (Series), Paint, Epoxy-Polyamide, General Specification for. ■
- e. NAVSEA S9086-VD-STM-000, Chapter 631, Preservation of Ships in Service (Surface Preparation and Painting).
- f. NAVSEA 0900-LP-016-9020, Procedure for Repair and Painting of Radar Camouflage Unit Components and Installing RAM on Closure Caps. ■

CHAPTER 2
IN-SERVICE OR RECEIPT INSPECTION

2-1 IN-SERVICE OR RECEIPT INSPECTION CRITERIA

2-1.1 Installed mast assemblies must be inspected periodically and new construction or overhauled mast assemblies should be examined upon receipt to determine if repair and/or repainting of fiberglass components is required.

2-1.2 Visually inspect the closure caps, radome, inner mast and faired mast for evidence of the following:

- a. Water Absorption - surface wet spots or seepage from cracks and pores.
- b. Salt Deposits - crystalline solid resulting from water seepage.
- c. Blistering - lifting or bubbling of the paint or fiberglass surface.
- d. Cracking - particularly in areas that are clamped with mast clamps.
- e. Gouges
- f. Peeling/Chipping
- g. Isolated wear or scratches that reveal green primer or bare fiberglass
- h. Wear in the bearing contact areas that reveals bare fiberglass or 50 percent or more of the green primer.
- i. Improperly applied paint - blotches, runs, sags, brush marks.

2-1.3 Areas of suspected water absorption can be inspected further by tapping with a small mallet. A sharp sound indicates a dry, solid laminate and a dull sound indicates a wet, delaminated area.

2-1.4 Defects listed in paragraph 2-1.2 are unacceptable.

2-1.5 Components with damage to the paint and/or primer layers as specified in paragraph 2-1.2, require repainting in accordance with CHAPTER 8.

2-1.6 Components with damage to the paint and primer layers and fiberglass as specified in paragraph 2-1.2, require repair in accordance with CHAPTER 6 and repainting in accordance with CHAPTER 8.

2-1/(2-2 blank)

CHAPTER 3 SYSTEM REMOVAL

3-1 PROCEDURE FOR REMOVAL

3-1.1 It is recommended that components which are identified for repair and/or repainting be moved to a controlled environment for surface preparation and restoration. See paragraph 8-2 for work area conditions.

NOTE

Surface defects may be repaired in place when schedules dictate. See paragraph 6-4.1 for the definition of a surface defect, and paragraphs 6-4.3 and 6-4.4 for repair methods and climate controls.

3-1.2 Mast and antenna systems must be removed using the lifting apparatus of reference (a), or reference (b) when applicable, and the procedures of reference (c).

3-1/(3-2 blank)

CHAPTER 4 SYSTEM DISASSEMBLY

4-1 REFERENCES FOR DISASSEMBLY

4-1.1 Detailed inspection, repair and painting of the mast assembly components is accomplished by disassembling the closure cap, radome, inner mast and faired mast.

4-1.2 NAVSEA Type I manuals and procedures listed in Table 4-1 provide guidelines or references for system disassembly:

TABLE 4-1 DISASSEMBLY REFERENCES

<u>SYSTEM</u>	<u>NAVSEA MANUALS AND PROCEDURES</u>
AN/BRA-9	0967-LP-413-2010
AN/BRA-15	0967-LP-208-2010
AN/BRA-21	0967-LP-208-5010
AN/BRA-23	0967-LP-185-5020
AN/BRA-34	S9585-AB-MMM-010/AN/BRA-34
OE-158/BRQ	0967-LP-533-3010
OE-207/BR	0900-LP-017-6020 SECT III
UHF/IFF (AS-1201/BPX)	0900-LP-019-2010
VLF (AT-317/BRR)	0900-LP-019-4010
AN/BRD-7	S9585-AC-MMM-010/AN-BRD-7
AN/BRD-7 (594 Class)	0900-LP-021-4020
637 C1 Type 18 Periscope	0900-LP-016-9081
688 C1 Type 18 Periscope	0900-LP-016-8081

4-2 DISASSEMBLY REQUIREMENTS FOR OVERHAULED MASTS

4-2.1 Repair of damage on any mast may require mast disassembly. Consult the drawing list in Table 4-2 for mast details prior to performing any repair.

4-2.2 Faired masts undergoing refurbishment during regular submarine overhaul must be disassembled into the forward, aft and channel or I-beam sections for inspection, repair and sealing of the internal surfaces. This requirement applies to masts undergoing regular overhaul only.

4-2.3 Special attention shall be given to not alter any work accomplished by installation of SHIPALTS or A & I items.

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TABLE 4-2
DRAWING LIST

594CL

171-5361552	AN/BRA-23 MAST FAIRING ASSY
171-5361555	AN/BRA-23 CENTER MAST ASSY
128-44911215	AN/BRD-7 OUTER AND INNER MAST
400-4320386	NO. 1 PERISCOPE FAIRING ASSEMBLY
522-2015696	PERISCOPE FAIRING ASSEMBLY
204-1863301	SNORKEL INDUCTION MAST ASSEMBLY

616CL

413-4491194	SSBN 616-627 CL OE-158/BRQ ANT GROUP MAST ASSY & DETS
125-2947708	SSBN 616 CL OVHL IFF/UHF ANT FAIRING MOD ASSY
111-2115725	IFF/UHF ANT CLOSURE CAP ASSY & DETS
111-2005563	IFF/UHF ANT MAST FAIRING ASSY & DETS
125-2005541	VLF LOOP ANT MAST FAIRING ASSY & DETS
125-2091537	MAST FAIRING ASSY & DETS, AN/BRA-9
125-2091547	AN/BRA-9 CLOSURE CAPS ASSY & DETS
125-2115291	SSBN 616 CL OVHL AN/BRA-15 ANT MAST FAIRING ASSY & DETS
125-2115666	AN/BRA-15 ANT CLOSURE CAPS ASSY & DETS
400-2662688	NO. 1 PERISCOPE FAIRING ASSEMBLY
400-2662208	NO. 2 PERISCOPE FAIRING ASSEMBLY

627CL

413-4491194	SSBN 616-627 CL OE-158/BRQ ANT GROUP MAST ASSY & DETS
125-2947708	SSBN 616 CL OVHL IFF/UHF ANT FAIRING MOD ASSY
111-2115725	IFF/UHF ANT CLOSURE CAP ASSY & DETS
125-2005541	VLF LOOP ANT MAST FAIRING ASSY & DETS
125-2115243	AN/BRA-16 ANT MAST FAIRING ASSY & DETS
125-2115291	SSBN 616 CL OVHL AN/BRA-15 ANT MAST FAIRING ASSY & DETS
400-2193914	PERISCOPE FAIRING ASSEMBLY

637CL (LONG HULL)

413-4491167	OE-158/BRQ ANT GROUP MAST ASSY & DETS
125-2143985	SSN 637 CL IFF/UHF ANT MAST FAIRING ASSY & DETS
125-2143987	IFF/UHF ANT FAIRING CAP ASSY & DETS
125-2143978	SSN 637 CL VLF LOOP ANT MAST FAIRING ASSY & DETS
125-2159996	VLF LOOP ANT CLOSURE CAP ASSY & DETS
125-2477248	AN/BRA-21 ANT MAST FAIRING ASSY & DETS
522-2569353	SSN 637 CL OVHL AN/BRA-34 ANT ASSY & DET MOD SA1486
400-4361610	NO. 1 PERISCOPE FAIRING ASSEMBLY
400-2143717	NO. 2 PERISCOPE FAIRING ASSEMBLY
501-2143841	SNORKEL INDUCTION MAST ASSEMBLY

637CL (SHORT HULL)

413-4491167	OE-158 ANT GROUP MAST ASSY & DETS
125-2143985	SSN 637 CL IFF/UHF ANT MAST FAIRING ASSY & DETS
125-2143987	IFF/UHF ANT FAIRING CAP ASSY & DETS
125-2143978	SSN 637 CL VLF LOOP ANT MAST FAIRING ASSY & DETS
125-2159996	VLF LOOP ANT CLOSURE CAP ASSY & DETS
125-2143939	SSN 637 CL AN/BRA-21 ANT MAST FAIRING ASSY & DET
125-2143946	AN/BRA-21 FAIRING CAP ASSY & DETS
522-2569353	SSN 637 CL OVHL AN/BRA-34 ANT ASSY & DET MOD SA1486
400-4361610	NO. 1 PERISCOPE FAIRING ASSEMBLY

TABLE 4-2 (Cont'd)

400-2143717	NO. 2 PERISCOPE FAIRING ASSEMBLY
501-2143841	SNORKEL INDUCTION MAST ASSEMBLY
640CL	
413-4491196	SSBN 640 CL OE-158/BRQ ANT GROUP MAST ASSY & DETS
125-2119083	SSBN 640 CL IFF/UHF ANT MAST FAIRING ASSY & DETS
111-2118567	IFF/UHF ANT CLOSURE CAP ASSY & DETS
125-2119071	VLF LOOP ANT - 3 CABLE SYS-MAST FAIRING ASSY & DETS
125-2119053	ANT MAST FAIRING ASSY & DETS, AN/BRA-9
125-2119060	CLOSURE CAP ASSY & DETS, AN/BRA-9
125-2119487	ANT MAST FAIRING ASSY & DETS, AN/BRA-15
128-4491143	MAST FAIRING ASSY (AN/BRA-21)
522-2147592	NO. 1 PERISCOPE FAIRING ASSEMBLY
400-2147645	NO. 2 PERISCOPE FAIRING ASSEMBLY
688CL	
128-4491143	MAST FAIRING ASSY (AN/BRA-34, AN/BRD-7)
128-4398597	CLOSURE CAPS
451-4491212	MAST INSTALLATION ASSEMBLY & DETAILS (AN/BRD-7/AN/BLD-1)
472-5361666	MAST ASSEMBLY (AN/BRD-7/AN/BLD-1)
445-4398606	INSTALLATION STD TOP DWG (AN/BRD-7 AND AN/BRD-7/AN/BLD-1)
400-4457257	NO. 1 PERISCOPE FAIRING ASSEMBLY (1ST & 2ND FLT)
400-5563839	NO. 2 PERISCOPE FAIRING ASSEMBLY (3RD FLT)
400-5901713	NO. 1 PERISCOPE FAIRING ASSEMBLY
400-6015780	NO. 2 PERISCOPE FAIRING ASSEMBLY (4TH FLT)
501-4457336	SNORKEL INDUCTION MAST ASSEMBLY
726CL	
5374 9000501	MAST FAIRING ASSY, OE-207
128-4398597	CLOSURE CAPS
400-4674854	NO. 1 PERISCOPE FAIRING ASSEMBLY
400-4574865	NO. 2 PERISCOPE FAIRING ASSEMBLY
400-4674866	NO. 2 PERISCOPE FAIRING ASSEMBLY
501-4675660	SNORKEL INDUCTION MAST ASSEMBLY

CHAPTER 5
DETAILED PRE-REPAIR INSPECTION

5-1 PRE-REPAIR INSPECTION CRITERIA

5-1.1 Disassemble the mast assembly and isolate the closure cap, radome, inner mast and faired mast to complete a detailed inspection of each. If applicable, disassemble the faired mast into forward, aft, channel or I-beam sections.

5-1.2 All helicoil, fastener voids and all accessible internal surfaces should be inspected visually for evidence of water penetration, surface cracks and delaminations.

5-1.3 Where applicable, inspect internal grounding screen mesh, grounding strips and grounding bars for corrosion, paint, marine growth and separation from the faired mast.

CAUTION

When TRIDENT OE-207/BR antenna faired mast assemblies require refinishing, damaged paint coatings shall be removed by carefully controlled sanding only.

Do not scrape old paint coatings from TRIDENT OE-207/BR antenna faired mast assemblies as damage to the fiberglass layers will result.

5-1.4 When evidence of water penetration is discovered, old paint must be completely removed from the entire fiberglass assembly by scraping and sanding. Clean the surface afterwards. Exercise caution to minimize cutting or fraying the fiberglass base and/or distortion of the bearing areas. Use bearing blocks, not a sander, on the forward and after bearing surfaces. See paragraph 6-8.1 for bearing block requirements. Removal of paint by chemical means and/or by heat or by any other method not specifically approved by NAVSEA is prohibited.

5-1.5 Inspect the structure further for defects listed in paragraph 2-1 and the following:

a. Delamination: Separation or loss of bond between laminate plies and/or between laminate plies and core inserts.

b. Voids: Gaseous pockets (porosity) that have been trapped and cured into the laminate.

c. Resin-starved Areas: Dry spots or areas that show fiber.

d. Resin-rich Areas: Resin filled spaces greater than 4 square inches that lack fiberglass cloth. A surface defect, as defined in paragraph 6-4.1, which has been repaired with Item 3, Table 6-1 is not considered a resin-rich area.

These defects, in addition to those of Paragraph 2-1, are not acceptable.

5-1.6 Repair damaged fiberglass areas and repaint in accordance with Chapter 6 and 8, respectively.

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CHAPTER 6 REPAIR

6-1 MATERIALS AND DEFINITIONS

6-1.1 CONSTRUCTION MATERIALS

6-1.1.1 The fiberglass components that make up a mast assembly are constructed with various materials by different processes as follows:

- a. Closure Cap - A composite constructed of various layers of glass cloth and resin. Caps can be manufactured with polyester or epoxy resin.
- b. Radome or Inner Mast - A composite manufactured by filament winding using an epoxy resin.
- c. Faired Mast - A composite constructed of various layers of glass cloth and resin. The majority of masts in-service are constructed with polyester resin. Masts procured by NSWCCD-SSES after September 1985 are manufactured with epoxy resin.

6-1.2 DEFINITIONS

6-1.2.1 Several of the terms and processes listed above are defined as follows:

- a. Laminate - A product made by laying sheets of material (glass cloth) with a bonding matrix (resin).
- b. Polyester Resin - Matrix used to bind together the glass cloth. Resin is transformed into a solid by mixing with a catalyst. Polyester resins are low cost, saturate fibers or "wet-out" easily and have versatile cure characteristics. These resins can be used to repair polyester composite structures only.
- c. Epoxy Resin - Matrix used to bind together the glass cloth. Resin is transformed to a solid by mixing with a hardener. Epoxy resins are more expensive but shrink less during cure than polyester resins. Adhesion is superior and epoxies bond well to a variety of substrates. These resins can be used to repair polyester or epoxy composite structures.
- d. Fiberglass Cloth - A woven fabric of glass fiber. The cloth is available in various weave styles which determine directional loading properties.
- e. Filament Winding - A fabricating process whereby continuous fibers impregnated during winding are placed on a rotating mandrel.

6-1.3 REPAIR MATERIALS

6-1.3.1 Materials designated in this manual (Table 6-1) for the repair of fiberglass items are:

- a. Epoxy Compound (Item 3) - A two component epoxy compound for filling and smoothing rough fiberglass surfaces. This material is impervious to water and has excellent sanding properties.

SE110-BK-MMO-010

b. Epoxy Resin (Item 2) - Epoxy resin exhibits good chemical and weathering resistance. It also displays superior freedom from cracking, crazing and erosion.

c. Fiberglass Cloth (Item 4) - 181 and 7781 styles of cloth are constructed with an 8H Satin weave. This is the most pliable weave which is necessary for forming on contoured surfaces. 7500 style is constructed of a plain weave and is suitable for use on flat surfaces.

6-2 CLASSIFICATION OF DAMAGE

6-2.1 Damage which occurs frequently to fiberglass structures of the mast assembly can be classified into the following types:

- a. Water Penetration
- b. Surface Defects
- c. Cracks and Delaminations
- d. Scored bearing areas
- e. Bearing wear of leading and trailing edges

6-2.2 Repairs made in accordance with this procedure are considered permanent repairs, which should be left in place if there is no separation of bond.

6-2.3 If damage cannot be repaired by the methods specified in this procedure the component must be scrapped or a formal request for deviation/waiver (Departure From Specifications form), must be submitted to NAVSEA for approval of repairs.

6-3 REWORKING WATER PENETRATED FAIRED MASTS

CAUTION

When TRIDENT OE-207/BR antenna faired mast assemblies require refinishing, damaged paint coatings shall be removed by carefully controlled sanding only.

Do not scrape old paint coatings from TRIDENT OE-207/BR antenna faired mast assemblies as damage to fiberglass layers will result.

6-3.1 Masts damaged by water penetration require drying and sealing before repainting. First sand all paint from the entire mast surface.

6-3.2 Visually inspect the stripped mast and check the mast "sound" using a small mallet. Tap the mast in a grid pattern with 6 inch spacing, as shown in Figure 6-1. A sharp sound signifies a dry, solid laminate while a dull sound indicates a wet, delaminated area.

6-3.3 Mark all areas that produce a dull sound.

6-2 Change A

6-3.4 Use a non-destructive moisture meter, Item 1 of Table 6-1 or equivalent, to record relative moisture readings at the marked areas. Set the meter to scale A for fiberglass materials. For reference, the relative moisture reading for a dry mast is 5-15 on the A scale.

6-3.5 Place the mast in "V" block supports and raise the end which is further away from the marked water-penetrated areas. Support the mast at a 10-30° angle and drill two holes in the lower of the two ends at the forward and aft sections. See Figure 6-2. Drill at the center of the wall thickness. The holes should have a maximum diameter of 1/4 inch and a maximum depth of two inches. Masts that experience subsequent waterlogging should have these same holes drilled out to accomplish drying.

CAUTION

Do not heat the faired mast to a temperature in excess of 160°F.

6-3.6 Use heat lamps, blowers or an oven to remove moisture. Large amounts of hot, dry air is required to dry composites. Heat the mast at a maximum temperature of 160° F, recording moisture readings at the marked locations every 24 hours. Avoid hot spots on the mast. Mast may be rotated, or flipped, occasionally to allow water drainage from both halves of the mast.

NOTE

Heat lamps shall be placed at an adequate distance (approximately 15-20 inches) from the mast surface to avoid localized overheating.

6-3.7 The moisture content will decrease and eventually level out. Continue heating until the relative moisture content at the marked areas remains constant over two consecutive 24 hour periods.

6-3.8 Drying times for fiberglass masts are unpredictable and vary with the age and condition of the mast. The drying times suggested above cannot be strictly applied to every case. Use the moisture meter as a guide. Check the mast more frequently if water damage appears minimal.

6-3.9 After drying, wipe down all internal and external surfaces possible with denatured alcohol.

6-3.10 Fill in drain holes with grooved fiberglass dowels and laminating resin, Item 2 of Table 6-1. The diameter of the dowel should be approximately 0.030 inches smaller than the hole diameter.

6-3.11 Seal all accessible external and internal surfaces, particularly machined edges, top and bottom mast edges and holes, with a brush coat (5 mils thick) of Item 2, Table 6-1 prior to painting. Sand the sealer with #100-200 grade silicon carbide paper to satisfy the finish requirements of paragraph 6-8.1.a.

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6-4

TABLE 6-1
REPAIR EQUIPMENT AND MATERIALS

ITEM #	ITEM	FUNCTION	SOURCE								
1	Moisture Meter, Sovereign Model 452A (or Equivalent)	Moisture Detection	Fairham LTD P.O. Box 1731 75 Prior Farm Road Duxbury, MA 02331 (617) 934-6724								
2	Laminating Resin Phillyclad 1776 Hardener 728 (or Equivalent)	Sealer-, Laminating Resin	Phila. Resins Corp. P.O. Box 454 Montgomeryville, PA (215) 855-8450								
3	Phillybond Blue 6A (or Equivalent)	Filler									
4	Fiberglass Cloth 181, 7781 Styles or 7500 Style	Re-inforcing Material	<table><tr><td><u>Comm</u></td><td><u>M</u></td></tr><tr><td>181</td><td>T</td></tr><tr><td>7781</td><td>T</td></tr><tr><td>7500</td><td>T</td></tr></table> QUANT:	<u>Comm</u>	<u>M</u>	181	T	7781	T	7500	T
<u>Comm</u>	<u>M</u>										
181	T										
7781	T										
7500	T										

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ERIALS

)	J.R. Overseas Co
'31	P.O. Box 370
rm Road	Kent, CT 06757
\ 02331	(203) 927-3808
5724	

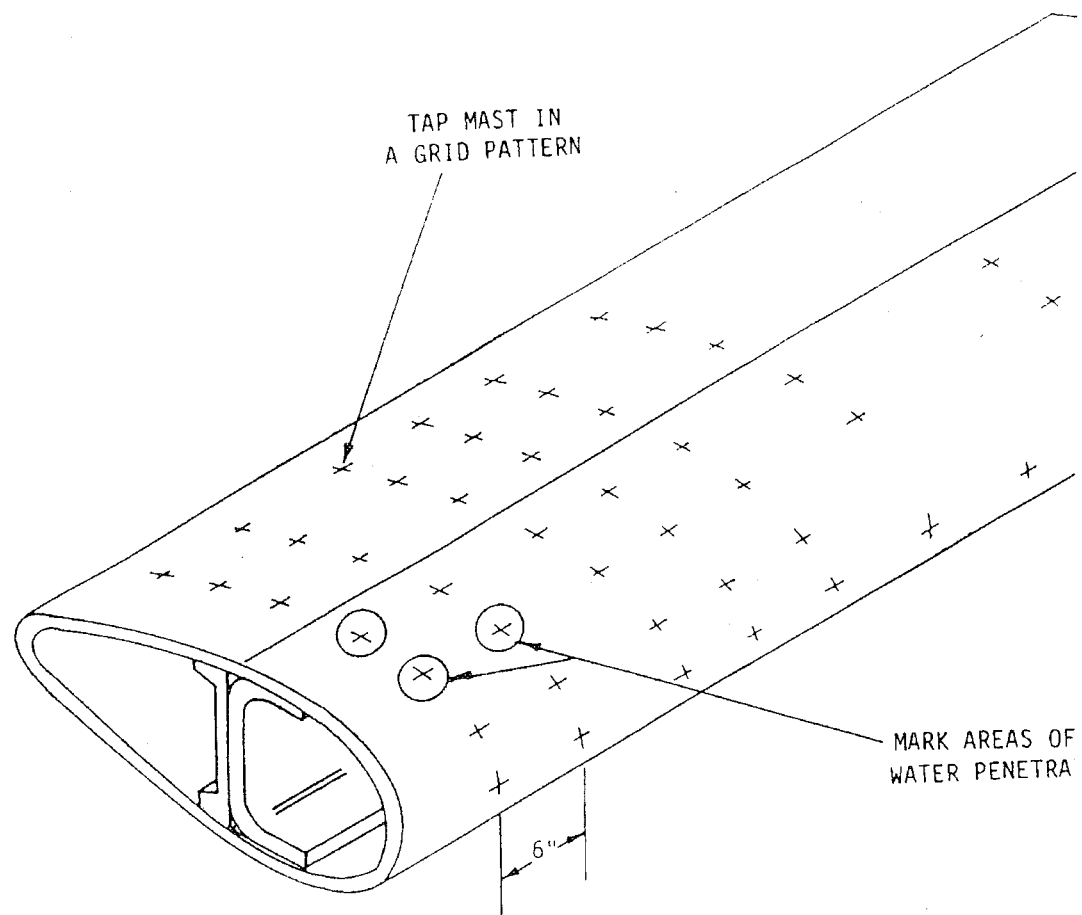
ins Corp.
54
ville, PA
3450

	MIL-C-9084C	NSN
	TY VIII	8305-01-182-1400
	TY VIII B	8305-01-007-2672
	TY XII A	8305-01-044-1659

QUANT: 38 IN X 125 yd

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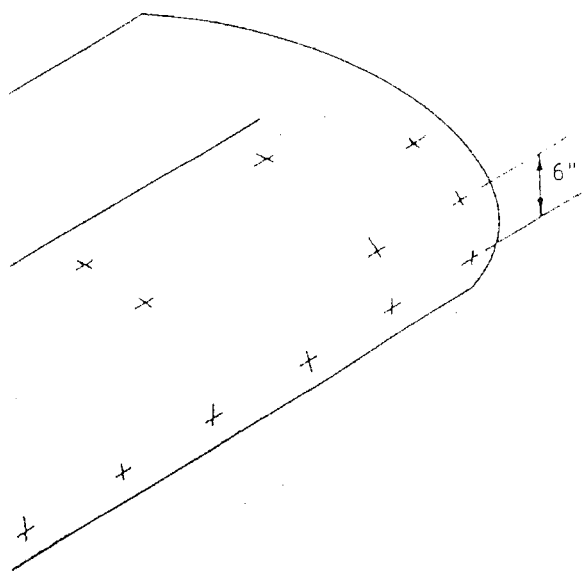
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6-5

Figure 6-1. Inspection of Water Penetration

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MARK AREAS OF
WATER PENETRATION

+ penetrated Mast

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Ref: NAVSEAINST 4160.3A

NAVSEA S0005-AA-GYD-030/TMMP

(Insert Classification of TMDER Here) CLASSIFICATION:

NAVSEA/SPAWAR TECHNICAL MANUAL DEFICIENCY/EVALUATION REPORT (TMDER)**INSTRUCTIONS:** Continue on 8-1/2" x 11" paper if additional space is needed.

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2. FOR CLASSIFIED TMDERS, SEE OPNAVINST 5510H FOR MAILING CLASSIFIED TMDERS.
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1. PUB NO. SE110-BK-MMO-010	2. VOL/PART	3. REV. NO./DATE OR TM CH. NO./DATE	4. SYSTEM/EQUIPMENT IDENTIFICATION
5. TITLE TECHNICAL MANUAL FOR INSPECTION, REPAIR, AND PAINTING, FIBERGLASS MAST ASSEMBLIES			6. REPORT CONTROL NUMBER (UIC-YEAR-XXXX)

7. RECOMMENDED CHANGES TO PUBLICATION

PAGE NO. A.	PARA- GRAPH B.	C. RECOMMENDED CHANGES AND REASONS

8. NAME AND WORK CENTER (Originator—Please Print)	9. DATE	10. DSN/COMM NO.	11. TRANSMITTED TO (NSDSA Will Complete)
12. SHIP HULL NO. AND/OR STATION ADDRESS (Do Not Abbreviate)			13. EMAIL ADDRESS (Originator)

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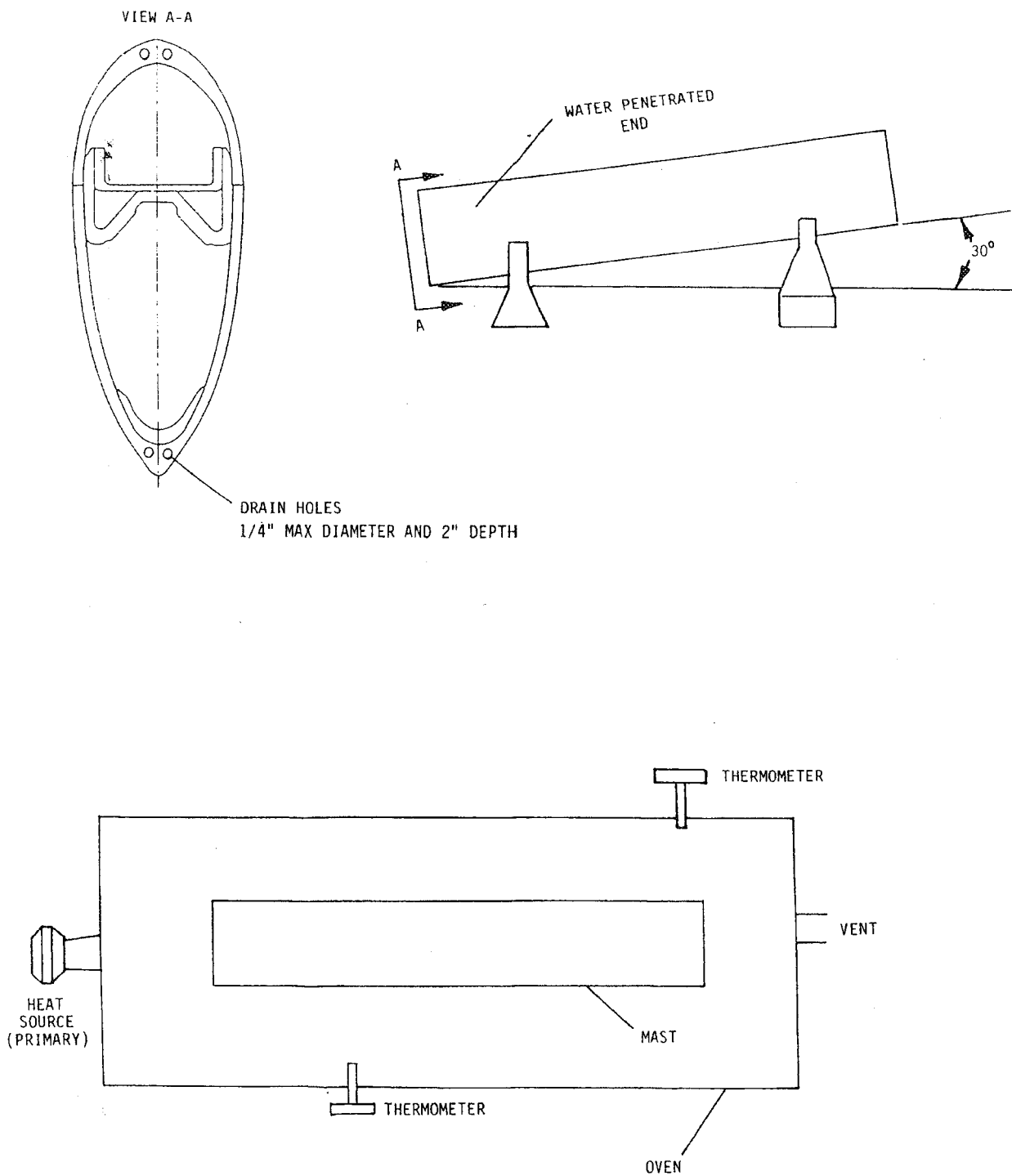
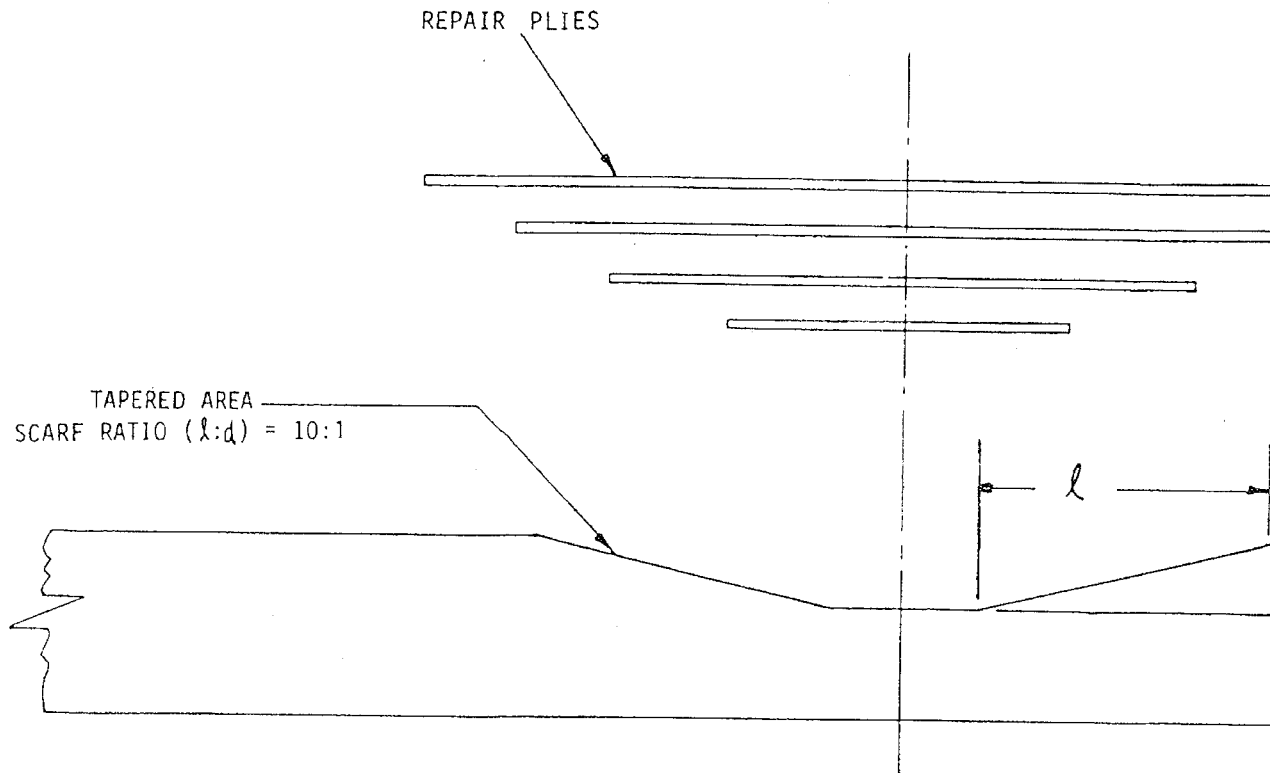


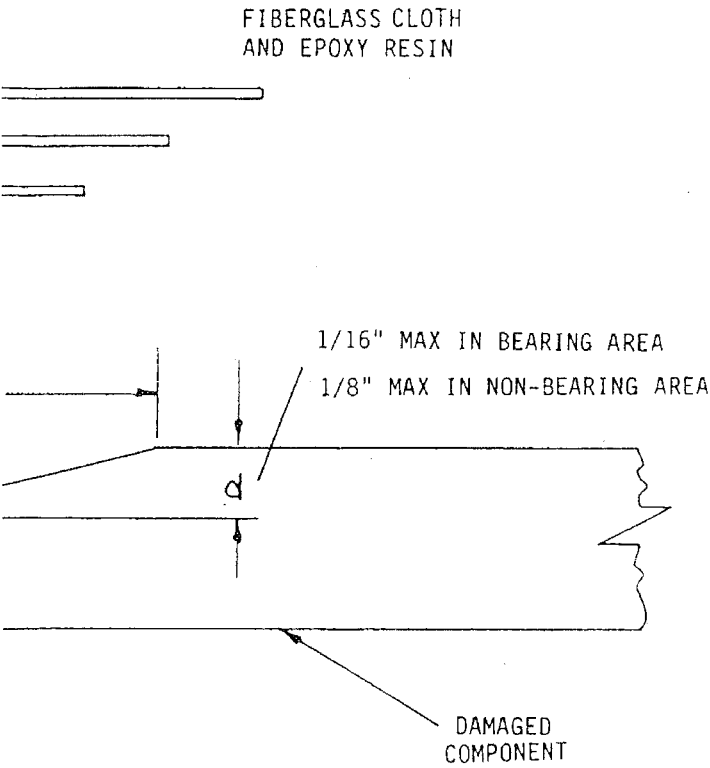
Figure 6-2. Drying of Water Penetrated Mast



6-7

Figure 6-3. Removal of Surface⁺ Defects

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+ Defects

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6-4 REPAIR OF SURFACE DEFECTS

6-4.1 A surface defect is classified as damage in any area which does not exceed 1/16 inch in depth, and minor impact damage (gouges, nicks) in a non-bearing area that does not exceed 1/8 inch in depth. Defects of this type are repaired in one of two ways, depending on the size of the affected area.

6-4.2 Defects less than 4 square inches, excluding continuous fiberglass scoring in the bearing areas (Paragraph 6-6), are filled with Item 3, Table 6-1 using a putty knife or plastic spreader as follows:

- a. Remove the defect by abrading with #50-100 grade silicon carbide paper.
- b. Clean with acetone and wipe with a cloth.
- c. Apply Item 3 filler, forcing the paste into the defect.
- d. Allow the filler to cure and then sand the surface smooth with #100-200 grade silicon carbide paper.
- e. Seal the area with a brush coat (5 mils thick) of Item 2, Table 6-1 before painting. Sand the sealer with #100-200 grade silicon carbide paper to satisfy the surface finish requirements of paragraph 6-8.1.a.

6-4.3 Defects greater than 4 square inches are filled with epoxy resin and fiberglass cloth, Items 2 and 4 of Table 6-1, as follows:

- a. Grind the affected area, as shown in Figure 6-3, with #50-100 grade silicon carbide paper, tapering the edges evenly around the defect. Ensure that the tapered area has a scarf ratio of at least 10:1.
- b. Clean the area with acetone and allow to dry.
- c. Cut repair plies of fiberglass cloth, Item 4, to replace the missing material. Each ply must overlap the preceding ply.
- d. Apply a brush coat of epoxy resin, Item 2, to the excavated area.

CAUTION

Application of excess force with the squeegee may result in a resin starved area.

e. Place the first layer of cloth into the epoxy, making sure the cloth becomes saturated with the resin. Repeat this process until the repaired surface is even with the original surface. Force out excess resin with a squeegee. Allow the repair to cure.

f. Sand the repair with #100-200 grade silicon carbide paper.

g. Seal the repair with a brush coat (5 mils thick) of Item 2, Table 6-1 before painting. Sand the sealer with #100-200 grade silicon carbide paper to satisfy the surface finish requirements of paragraph 6-8.1.a.

6-4.4 Surface defects may be repaired in place by IMA when schedules dictate. Accomplish this in accordance with paragraph 6-4.3. Erect temporary containment for climate control. Repairs should be made under cover with the repair surface and enclosed area maintained at a minimum temperature of 50°F.

CAUTION

When sail area heating is required, do not locate the heat source in the vicinity of the mast hoist cylinders. A maximum sail temperature increase of 50° F is permitted when masts are fully raised and hull stop valves are shut.

6-5 REPAIR OF CRACKS, DELAMINATIONS

6-5.1 Repair of cracks and delaminations which do not qualify as surface defects are considered on a case-by-case basis by NAVSEA review of a deviation/waiver (Departure From Specifications form). The deviation/waiver request must specify type of damage and location on the fairing.

6-5.2 Internal grounding screen mesh occasionally delaminates from the faired mast. When applicable, secure the separated screen to the fiberglass mast by applying epoxy resin, Item 2 of Table 6-1, with a roller. Limit the total screen and epoxy thickness to the limit specified on the appropriate fairing assembly drawing.

6-6 REPAIR OF SCORED BEARING AREAS

6-6.1 Bearing areas of masts and radomes are scored when grit collects in the mast bearings. Subsequent cycling results in damage to the paint and/or fiberglass surface. It is important to remove bearing grit prior to reinstallation of the mast and/or radome. Remove grit with a bearing scraper device in lieu of sanding.

6-6.2 Paint damage can be corrected by following the painting procedures of Chapter 8. Deep scoring (1/16 inch or greater) is repaired in accordance with paragraph 6-4.3.

6-6.3 Repair light scoring (less than 1/16 inch) of the fiberglass surface by sanding with #50-100 grade silicon carbide paper and applying brush coats of epoxy resin, Item 2 of Table 6-1. See Figure 6-4.

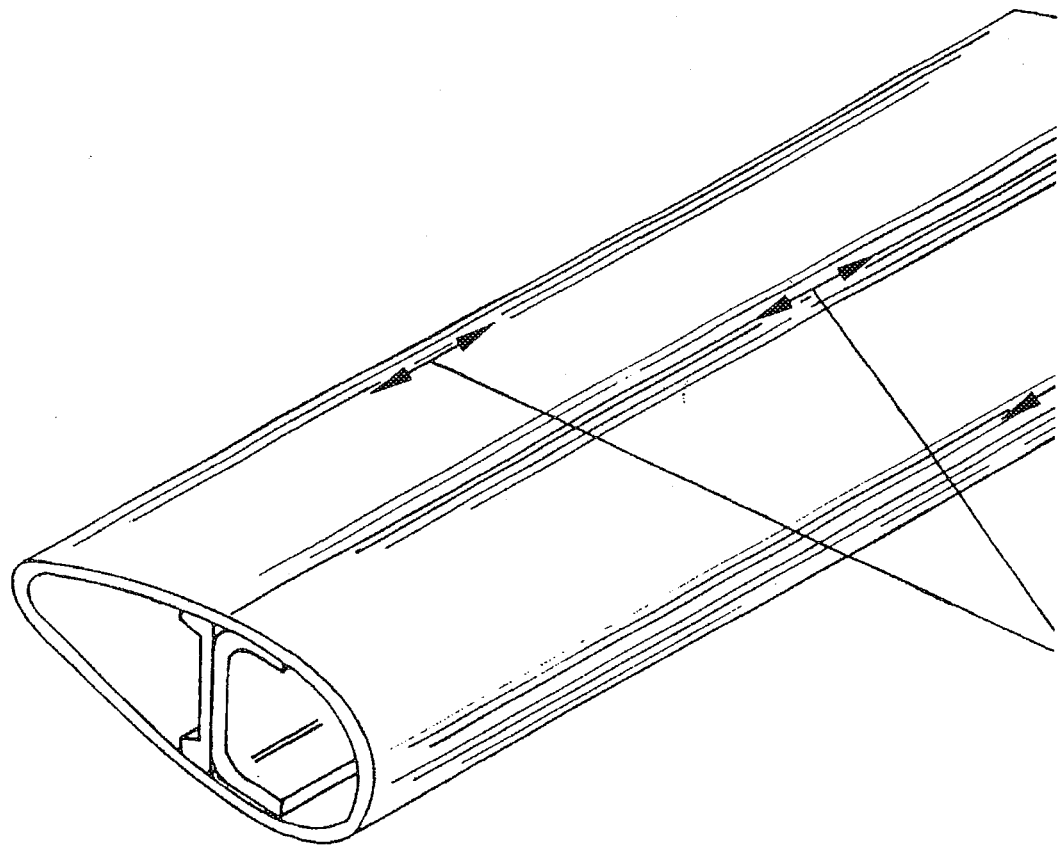
NOTE

Do not repair scored masts with filler, Item 3 of Table 6-1. This material tends to crack and break loose under bearing and clamping loads. Use Item 3, Table 6-1 to repair pits, gouges and small scratches only.

6-6.4 Sand the repaired area with #100-200 grade silicon carbide paper to satisfy surface finish requirements of paragraph 6-8.1.a.

6-7 REPAIR OF WORN BEARING AREAS

6-10



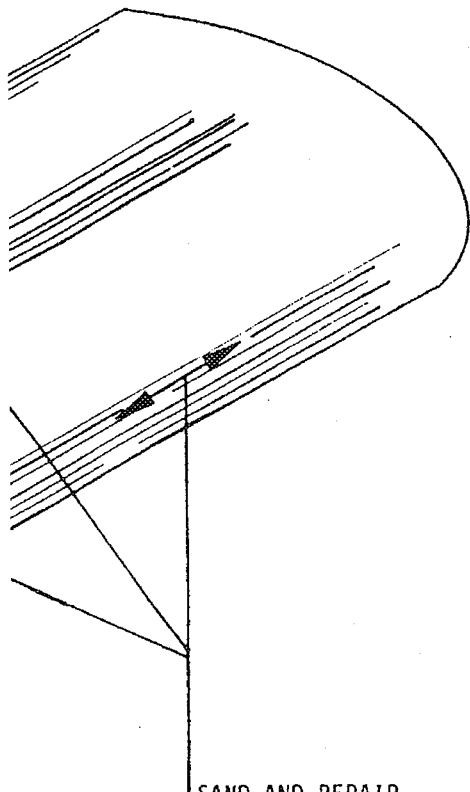
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Figure 6-4. Repair of Scored Bearing Areas

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SAND AND REPAIR
SCORED AREAS WITH
EPOXY RESIN

(AND FIBERGLASS CLOTH IF APPLICABLE)

reas

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CAUTION

To retain proper clearances between bearing shoes and mast surface, the contour of the faired mast must be maintained during repair in bearing areas.

6-7.1 Worn bearing areas are repaired by preparing the surface for additional layers of glass cloth. Limit machining of the original surface to 1/16 inch. Taper machined edges with a 10:1 scarf ratio.

6-7.2 Lay up new layers of glass cloth, Item 4 of Table 6-1, and epoxy resin, Item 2 of Table 6-1. Lay up enough cloth so that the mast outer surface is a maximum of 1/16 oversize.

6-7.3 Allow the repairs to cure and machine to fairing drawing requirements.

6-7.4 Sand the surface with #100-200 grade silicon carbide paper and seal with a brush coat (5 mils thick) of Item 2, Table 6-1.

6-7.5 Sand the sealer with #100-200 grade silicon carbide paper to satisfy surface finish requirements of paragraph 6-8.1.a.

6-8 POST REPAIR INSPECTION CRITERIA

6-8.1 Prior to painting, reassemble a faired mast if it was taken apart. Inspect all repaired closure caps, radomes, inner masts or faired masts for the following:

a. Surface Finish: All exterior and interior bearing surfaces shall have a maximum of 32 microinch finish. All other external surfaces shall have a maximum of 125 microinch finish. All other internal surfaces shall have a maximum of 500 microinch finish.

b. External Bearing Surfaces: A 10-inch long master bearing block for each of the bearing surfaces shaped in accordance with the offsets shown on production drawings, shall indicate 50 percent area contact in any 10 inch length increment when rubbed along the full length of the radome, inner mast or mast. The bearing block may be lapped to the mast contour, but must remain within the tolerance for the Table of Offsets. Areas of non-contact shall not be continuous and shall not be larger than 2 square inches in area. In no case shall any 5 square inches of bearing block surface have more than 60 percent non-contact area.

c. Straightness: Straightness is measured in accordance with NAVSSES SAED QA-1018 Quality Assurance Instruction for Straightness Check of Mast Fairing, or other method that meets the same accuracy requirements. Figure 6-5 shows the general method of measuring a surface straightness.

For any given radome, inner mast or faired mast, the drawing and fabrication specification for the particular item should be examined for bearing locations, straightness requirements and overall length to determine the spacing of supports and number of check points required.

Measurements are required throughout the entire length on all bearing surfaces (Figure 6-6) prior to the application of primer or paint.

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CAUTION

Do not leave excess sealer on bearing surfaces. Internal after bearing surfaces should not be sealed.

d. Sealing: Machined edges, including the top and bottom edges and edges of all openings, and holes in laminates shall be sealed by coating with Item 2, Table 6-1.

e. Workmanship: Workmanship shall be of the highest quality. The closure cap, radome, inner mast or faired mast shall be free of uncured areas, gaps, holes, cracks, unbonded areas, blisters, resin pockets, areas lacking resin, tackiness, excess surface resin, wrinkles, delaminations, air or gas pockets, porosity of other similar defects. No repair shall be permitted in high stress areas, or in other areas where such repair may impair the performance of the unit, as determined by NAVSEA.

f. General Appearance: The laminate shall be uniform in appearance along its length and free of foreign matter. Burrs and sharp edges shall be removed.

g. Exposed hardware: Grounding strips and indicating magnets should be clean and free of corrosion.

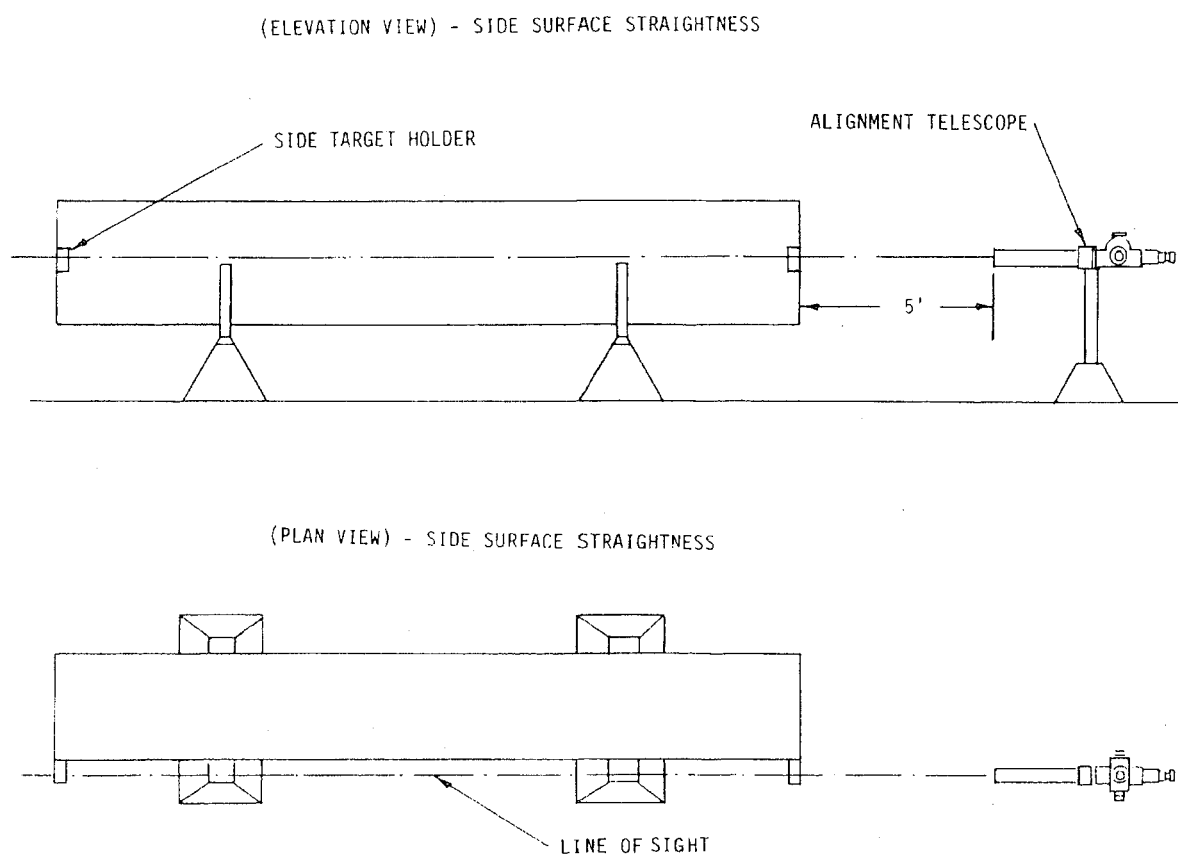
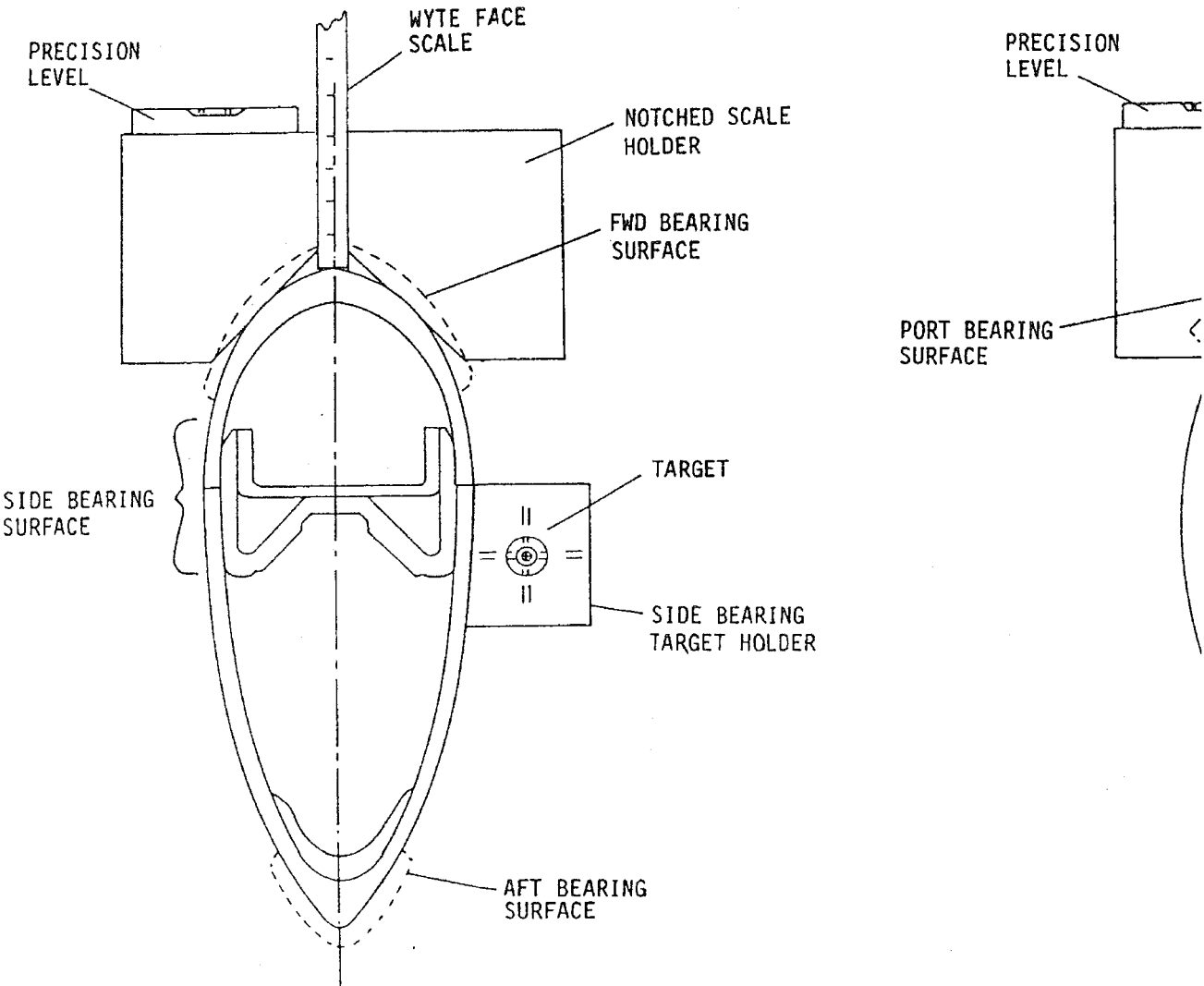


Figure 6-5. Mast Fairing Straightness

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6-14



FAIRED MAST TARGET AND SCALE POSITIONING

INNER M

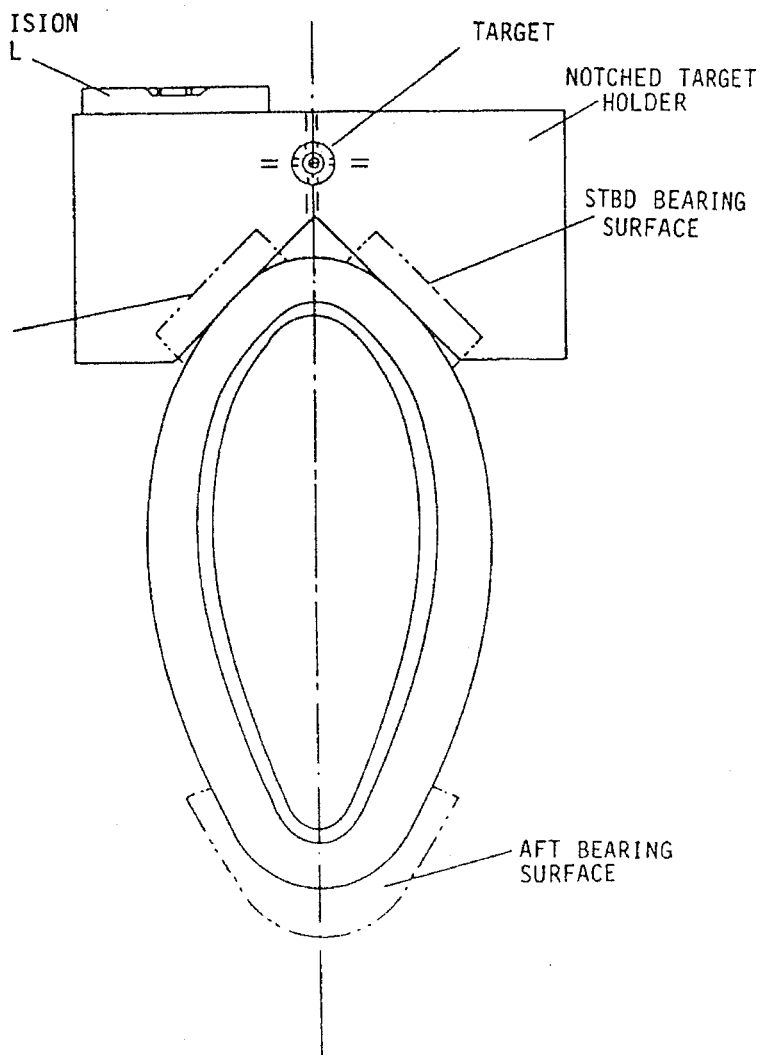
Figure 6-6. Mast and Radome Bearing Area

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INNER MAST/RADOME TARGET POSITIONING

Bearing Areas

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CHAPTER 7 SAFETY PRECAUTIONS FOR REPAIR AND PAINTING MATERIALS

7-1 FACILITIES

7-1.1 Painting facilities should meet the requirements of the Occupational Safety and Health Act Part 1910 of Title 29, Code Of Federal Regulations.

7-1.2 The area in which refinishing work and painting is to be performed shall be well ventilated to remove harmful vapors containing petroleum distillates during actual application of the primer and use of the reducer solvents.

7-2 PERSONNEL PRECAUTIONS

7-2.1 The epoxy coating materials (Table 8-1) contain chemicals that are toxic. Carelessness can produce health hazards. Precautions must be taken to avoid contact of these materials with the skin and eyes. They shall be kept away from heat, sparks and open flame.

7-2.2 Soap and water, not solvent, shall be used to remove material from the skin. Solvents thin the paint and spread it over the skin, permitting greater penetration of paint into the skin. A waterless hand cleaner may be used before the soap and water if desired. Should any of the epoxy coating or reducer materials get into the eyes, rinse with copious amounts of water and obtain medical aid immediately. These materials are harmful or fatal if swallowed. Get medical aid immediately, if swallowed; do not induce vomiting.

7-2.3 Personnel must wear the proper type of face mask in repair or painting areas.

a. Dispersoid Respirator - for protection against dust present during sanding. Respirator contains filters only.

b. NIOSH approved chemical cartridge respirator - for protection against fumes and solvent vapors. Respirator contains activated carbon cartridges which absorb fumes or vapors.

7-2.4 Safety glasses or safety goggles must be worn in areas where there is a possibility of particulates, mists or vapors entering the eyes.

7-2.5 Personnel mixing resins or paints must wear protective garments that fit snugly at the ankles, neck and wrists; and solvent-resistant synthetic rubber or plastic gloves and an apron.

7-3 MATERIAL USE

7-3.1 Neatness is important. Avoid spillage, promptly remove drippings and avoid deposits on tools. Discard waste materials in covered waste cans. Keep all containers clearly identified and tightly covered when not in use. Do not leave combustible material in a room that is not ventilated.

7-4 STORAGE

7-4.1 Epoxy and polyurethane coating materials and solvent shall be stored at a temperature of 65°-85°F.

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7-4.2 The containers of epoxy coating materials and solvent reducer should be clearly marked with the name, formula number and manufacture date and tightly secured.

7-4.3 The average shelf life of the epoxy repair resins and hardeners in the original sealed containers at storage temperatures of 65°-85°F is 12 months.

7-4.4 The contents of any paint can more than 2 years old shall be inspected and, if unfit, surveyed. If uncertain as to whether the paint is suitable for reworking, particularly where large quantities are involved, send representative samples to the laboratory division of the nearest naval shipyard or to NAVSSES Code 053.

CHAPTER 8 PAINTING PROCEDURES

8-1 PAINTS AND COATINGS

8-1.1 Paints conforming to MIL-P-24441 (series), reference (d), are required for priming and finishing fiberglass mast assemblies. See table 8-1.

TABLE 8-1. PAINT AND COATING MATERIALS

ITEM	RESIN	HARDENER	NSN
1.	Navy Formula 150 Green Primer MEL-P-24441/1B Part B	Navy Formula 150 Green Primer MIL-P-24441/1B Part A	8010-00-410-8452 - 2 gal. 8010-00-410-6757 - 10 gal.
2.	Navy Formula 153 Type III Dark Gray Exterior MEL-P-24441/23 Part B	Navy Formula 153 Type III Dark Gray Exterior MIL-P-24441/23 Part A	8010-01-350-4744 - 1 gal. 8010-01-302-3604 - 5 gal.

8-2 WORK AREA CONDITIONS

8-2.1 The work area should be isolated, clean, relatively dust-free, well-ventilated with a controllable temperature range from 50° to 95°F.

8-2.2 Relative humidity must be less than 80 percent.

8-2.3 The item to be painted must be at a temperature of 50° to 95°F.

8-2.4 Touchup painting may be accomplished on installed assemblies only when required by restricted schedules. Follow the guidelines of paragraph 6-4.4.

8-3 PAINT MIXING AND USAGE INSTRUCTIONS

8-3.1 MIL-P-24441B is a two component epoxy paint system which will not harden unless both components are mixed together.

8-3.2 The use of thinner is limited to a maximum of one part solvent per five parts of epoxy paint (20 percent by volume). The only approved thinning agent is 50/50 mixture of naphtha and butanol.

8-3.3 Temperature of the paint should be held between 65° and 85°F for 24 hours prior to mixing.

8-3.4 Temperature of the paint and work area should be maintained at 50° to 95°F for optimal results.

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8-3.5 Mix component A and component B separately on a mechanical paint shaker, according to the following schedule:

CONTAINER SIZE	MIXING TIME
1 Quart	5 minutes
1 Gallon	10 minutes
2 Gallons	10-15 minutes
5 Gallons	15-20 minutes

8-3.6 After individual mixing, mix components A and B together in a 1:1 ratio by volume. If the entire containers are not to be mixed, the two quantities must be measured to confirm the 1:1 volume ratio. Mix according to the schedule in 8-3.5.

8-3.7 The stand-in time is the time required of a two-part paint to chemically combine after it has been mixed together. The paint system must be allowed to react for the appropriate stand-in time. The stand-in time varies with the work area temperature as follows:

WORK AREA TEMPERATURE	STAND-IN TIME BEFORE APPLICATION
50° - 60°F	2 hours
60° - 70°F	1-1/2 hours
70° - 90°F	1 hour
90° - 95°F	None

8-3.8 Paint coatings must not be applied below 50°F under any circumstances. The coatings will not cure properly.

CAUTION

Do not attempt to use the mixture beyond the limits shown.

8-3.9 All paint must be used within the following time limits for work area temperatures:

WORK AREA TEMPERATURE	TIME AFTER MIXING
50° - 60°F	8 hours
60° - 70°F	6 hours
70° - 85°F	4 hours
85° - 95°F	Use Immediately

8-3.10 Do not use the mixture beyond the limits shown in the table above. Do not add thinner to extend pot life of the mixture.

8-2 Change B

8-4 PAINTING METHOD

8-4.1 A siphon cupgun is preferred to a pressure gun of any type, although the latter may be used. Use a Binks #17 or #18 model with a #66 nozzle, or a Binks #7 model with a #36 nozzle (or equivalents able to provide controlled spray pattern).

8-4.2 An approximate air pressure of 30 to 40 psi is required for the smooth application of items 1 through 5 (table 8-1).

8-4.3 An approximate distance of 12 to 14 inches should be maintained between the paint nozzle and the surface of the work piece throughout the painting operation.

8-4.4 Care should be exercised to ensure that the spray coating is uniform, smooth, and free from high and low areas. A haphazard application will affect the mast dimensional sizes, making it impossible to maintain uniform bearing clearances.

8-4.5 DRYING TIMES AND PAINT THICKNESS

CAUTION

One spray coating (medium) is approximately 1.5 mils thick wet. Care should be exercised to ensure that the finished mast, radome, or inner mast outer diameter is not oversized.

8-4.5.1 On heavy coats (approximately 3 mils wet), wait a minimum of 8 hours between coats. On medium coats (approximately 1.5 mils wet), wait a minimum of one hour between coats. Wet film thickness (WFT) can be measured with a Nordson wet film thickness gage (or equivalent). Measure the WFT on a test piece to ensure proper settings of the spray guns.

8-4.5.2 Light sanding and surface cleaning is recommended when the cure time between coats exceeds 6 hours.

8-4.5.3 If more than 7 days elapse after application of a coat, a tack coat must be applied before the application of the next coat.

8-5 PAINTING INSTRUCTIONS

8-5.1 Prior to painting, a disassembled faired mast must be reassembled. In addition, all closure caps, masts, and radomes must be resin sealed with item 2 (table 6-1) and sanded to satisfy the surface requirements of paragraph 6-8.1.a.

8-5.2 The designated paints for the closure caps, radomes, inner masts, and faired masts are provided in table 8-2. The item numbers refer to table 8-1. For closure caps with radar absorbent material (RAM), see reference f.

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TABLE 8-2. DESIGNATED PAINTS

COMPONENT	PRIMER COAT	FINISH COAT
Faired Mast Closure Cap (without RAM)	Item 1 (Green)	Item 2 (Dark Gray)
Radome Closure Cap	Item 1 (Green)	Item 1 (Green) Item 2 (Dark Gray)
Radome	Item 1 (Green)	Item 1 (Green)
Inner Mast	Item 1 (Green)	Item 2 (Dark Gray)
Faired Mast	Item 1 (Green)	Item 2 (Dark Gray)

8-5.3 PAINTING OF CLOSURE CAPS

8-5.3.1 The painting procedure for faired mast closure caps is designated in table 8-3 for various fairing assemblies. This procedure applies to caps that are not covered with RAM. See reference f for application/painting of RAM on closure caps. Caps that must be stored or transported prior to RAM application may be covered with a prime coat of item 1 according to paragraphs 8-5.3.2.1 through 8-5.3.2.3. This coat must be removed prior to application of the RAM.

8-5.3.2 PAINTING OF FAIRED MAST CLOSURE CAPS

8-5.3.2.1 Abrade the surface of the cap with #100 to #200 grade silicon carbide paper. Wet sand a previously painted cap and dry sand a bare fiberglass cap.

8-5.3.2.2 Remove all traces of sand and grit from a painted surface with a solvent mixture or equal parts by volume of xylene and isopropanol, and wipe with a cloth. Wipe sand and grit from a bare fiberglass surface with acetone.

8-5.3.2.3 Spray the cap with one coat (1.5 mils wet) of item 1 (table 8-1) as the prime coat.

8-5.3.2.4 After a minimum of 6 hours cure time, sand the prime coat lightly with #280 grade silicon carbide dry paper. Repeat paragraph 8-5.3.2.2.

8-5.3.2.5 Spray the cap top with seven coats (1.5 mils wet) of item 2 (table 8-1), waiting a minimum of one hour between coats, or with three coats (3 mils wet), waiting 8 hours between coats.

8-5.3.2.6 Wait a minimum of 12 hours for the final coat to harden, and then lightly sand the surface smooth using #400 grade silicon carbide paper (wet) to obtain a 32-microinch finish. Use fresh water to clean all residue from the surface.

8-5.3.3 PAINTING OF RADOME CLOSURE CAPS

8-5.3.3.1 Abrade, clean, and prime the cap in accordance with paragraphs 8-5.3.2.1 through 8-5.3.2.4.

8-5.3.3.2 Spray the top and the sides of the cap with seven coats (1.5 mils wet) of item 2 (table 8-1), waiting a minimum of one hour between coats, or with three coats (3 mils wet), waiting 8 hours between coats.

8-5.3.3.3 Spray the sides of the cap with seven coats (1.5 mils wet) of item 1 (table 8-1), waiting a minimum of one hour between coats, or with three coats (3 mils wet), waiting 8 hours between coats.

8-5.3.3.4 Wait a minimum of 12 hours for the final coat to harden, and then lightly sand the surface smooth using #400 grade silicon carbide paper (wet) to obtain a 32-microinch finish. Use fresh water to clean all residue from the surface.

8-5.4 PAINTING OF RADOMES

8-5.4.1 Abrade the radome surface with #100 to #200 grade silicon carbide paper. Wet sand a previously painted radome and dry sand an unpainted radome.

8-5.4.2 Remove all traces of sand and grit from a painted surface with a solvent mixture or equal parts by volume of xylene and isopropanol, and wipe with a cloth. Wipe sand and grit from an unpainted radome with acetone.

8-5.4.3 Spray the radome with one coat (1.5 mils wet) of item 1 (table 8-1) as the prime coat.

8-5.4.4 After a minimum of 6 hours cure time, sand the prime coat lightly with #280 grade silicon carbide dry paper. Repeat paragraph 8-5.4.2.

8-5.4.5 Spray the radome with seven coats (1.5 mils wet) of item 1 (table 8-1), waiting a minimum of one hour between coats, or with three coats (3 mils wet), waiting 8 hours between coats.

8-5.4.6 Wait a minimum of 12 hours for the final coat to harden, and then lightly sand the surface smooth using #400 grade silicon carbide paper (wet) to obtain a 32-microinch finish. Repeat paragraph 8-5.4.2. Use fresh water to clean all residue from the surface.

8-5.5 PAINTING OF INNER MASTS

8-5.5.1 Abrade the inner mast surface of the cap with #100 to #200 grade silicon carbide paper. Wet sand a previously painted inner mast and dry sand an unpainted inner mast.

8-5.5.2 Remove all traces of sand and grit from a painted inner mast with a solvent mixture or equal parts by volume of xylene and isopropanol, and wipe with a cloth. Wipe sand and grit from an unpainted inner mast with acetone.

8-5.5.3 Spray the inner mast with one coat (1.5 mils wet) of item 1 (table 8-1) as the prime coat.

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8-5.5.4 After a minimum of 6 hours cure time, sand the prime coat lightly with #280 grade silicon carbide dry paper. Repeat paragraph 8-5.5.2.

8-5.5.5 Spray the inner mast with seven coats (1.5 mils wet) of item 2 (table 8-1), waiting a minimum of one hour between coats, or with three coats (3 mils wet), waiting 8 hours between coats.

8-5.5.6 Wait a minimum of 12 hours for the final coat to harden, and then lightly sand the surface smooth using #400 grade silicon carbide paper (wet) to obtain a 32-microinch finish. Use fresh water to clean all residue from the surface.

8-5.6 PAINTING OF FAIRED MASTS

8-5.6.1 Abrade the surface with #100 to #200 grade silicon carbide paper. Wet sand a previously painted mast and dry sand an unpainted mast.

8-5.6.2 Remove all traces of sand and grit from a painted mast with a solvent mixture or equal parts by volume of xylene and isopropanol, and wipe with a cloth. Wipe sand and grit from an unpainted mast with acetone.

8-5.6.3 Where applicable, cover the grounding strips and all other mast hardware items with masking tape for protection from paint. Do not apply paint to the faired mast external or internal grounding strips or the internal bearing areas.

8-5.6.4 Spray the mast with one coat (1.5 mils wet) of item 1 (table 8-1) as the prime coat.

8-5.6.5 After a minimum of 12 hours cure time, sand the prime coat lightly with #280 grade silicon carbide dry paper. Repeat paragraph 8-5.6.2.

8-5.6.6 Spray the faired mast with a total of seven coats (1.5 mils wet) of item 2, waiting a minimum of one hour between coats, or with three coats (3 mils wet), waiting 8 hours between coats.

8-5.6.7 Remove the masking tape from the grounding strips and other mast hardware, if applicable.

8-5.6.8 Allow a minimum of 24 hours for the final coat to harden, and then lightly sand the surface smooth using #400 grade silicon carbide paper (wet) to obtain a 32-microinch finish. Use fresh water to clean all residue from the surface.

8-6 ACCELERATED CURING OF FINISHES

8-6.1 Accelerated curing of finishes is not recommended, but can be accomplished using a heat source.

8-6.2 Prepare the surface as described in paragraphs 8-5.6.1 through 8-5.6.3.

8-6 Change B

8-6.3 Erect temporary cover, in the form of a tent, around the work piece providing room for the workman.

8-6.4 Apply the finished paint coatings in accordance with paragraph 8-5.6.6.

8-6.5 Allow the final coat to air dry for 4 hours.

8-6.6 Heat the work piece indirectly and evenly to a temperature of 120° to 160°F using a local heat source. Avoid hot spots. Heat for 24 hours at 120° to 160°F before subjecting work piece to clamping, loading, corrosive agents, or immersion.

8-6.7 Wet sand using #400 grade silicon carbide paper to obtain a 32-microinch finish.

8-6.8 Clean all residue from the surface with fresh water.

8-7 POST-PAINTING REQUIREMENTS

8-7.1 Spray equipment should be cleaned immediately after use in order to prevent hardening of paint in the spray gun.

8-7.2 All cloth saturated with acetone or xylene and isopropanol should be discarded in covered waste cans. Do not leave saturated cloth uncovered in a poorly ventilated room, as this creates a fire hazard due to low solvent flashpoints.

8-8 PRECAUTIONS FOR CURED COATINGS

8-8.1 The finish coats listed in table 8-1 must be allowed to dry for a minimum of 48 hours at a minimum temperature of 70°F before being subjected to clamping, loading, corrosive agents, or immersion.

8-9 PAINT INSPECTION CRITERIA

8-9.1 After the finish coats have cured sufficiently, inspect the closure cap, radome, or faired mast for the following:

- a. The paint film must have a minimum thickness of 5.0 mils dry. Measure major and minor chord dimensions to verify 5.0 mils dry application.
- b. The paint finish shall be free of runs and sags.
- c. Verify by mechanical or visual means that all bearing surfaces have a 32-microinch finish.
- d. The paint finish shall be hard and not capable of being deformed by a firmly pressed edge such as that of a putty knife.
- e. If applicable, the grounding strips and other hardware shall be clean and free of paint and corrosion.

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TABLE 8-3
PAINTING METHODS: FAIRED MAST CLOSURE CAPS

SYSTEM	SE110-BK-MMO-010	NAVSEA 0900-LP-016-9020 (Require RAM)
AN/BRA-9	X	
AN/BRA-15	X	
AN/BRA-21	X	
AN/BRA-23	X	
AN/BRA-34	X	
AS-1201/BPX (UHF/IFF)	X	
AT-317/BRR (VLF)	X	
OE-158/BRQ	X	
OE-207/BR	X	
AN/BRD-7 (594 CL)		X
AN/BRD-7 (637 CL)		X
AN/BRD-7 (688 CL)		X
AN/BRD-7/AN/BLD-1		X
No. 1 PERISCOPE (ALL CLASSES)	X	
No. 2 PERISCOPE (ALL CLASSES)	X	

CHAPTER 9
SYSTEM REASSEMBLY

9-1 REFERENCES FOR ASSEMBLY

9-1.1 After completion of the paint inspection, the closure cap, radome, inner mast and/or faired mast must be reassembled.

9-1.2 Refer to the Type 1 manuals and procedures of paragraph 4-1.2 for assembly guidelines.

9-1/(9-2 blank)

CHAPTER 10
SYSTEM INSTALLATION

10-1 PROCEDURES FOR INSTALLATION

10-1.1 The refurbished antenna mast assembly must be installed using the lifting apparatus of references (a), or reference (b) when applicable, and the procedures of reference (c).

NOTE

Bearing clearances must be reset after refurbishment of a mast or radome to restore proper bearing clearances and allow cycling without binding or scoring.

10-2 REQUIREMENTS FOR PIERSIDE OPERATION OF MAST ASSEMBLIES

10-2.1 Water lubrication of all antenna and mast bearings is required any time a mast assembly is cycled or repositioned. During installation, water lubricate the bearings while cycling to adjust bearing and erecting mechanisms.

10-1/(10-2 blank)

CHAPTER 11 REFURBISHMENT PLANNING ESTIMATES

11-1 MAST RESTORATION PLANNING GUIDANCE

11-1.1 The primary cause of substandard repairs and paint finishes is poor planning. Inadequate time is allotted for surface preparation and proper cure of repair/painting materials.

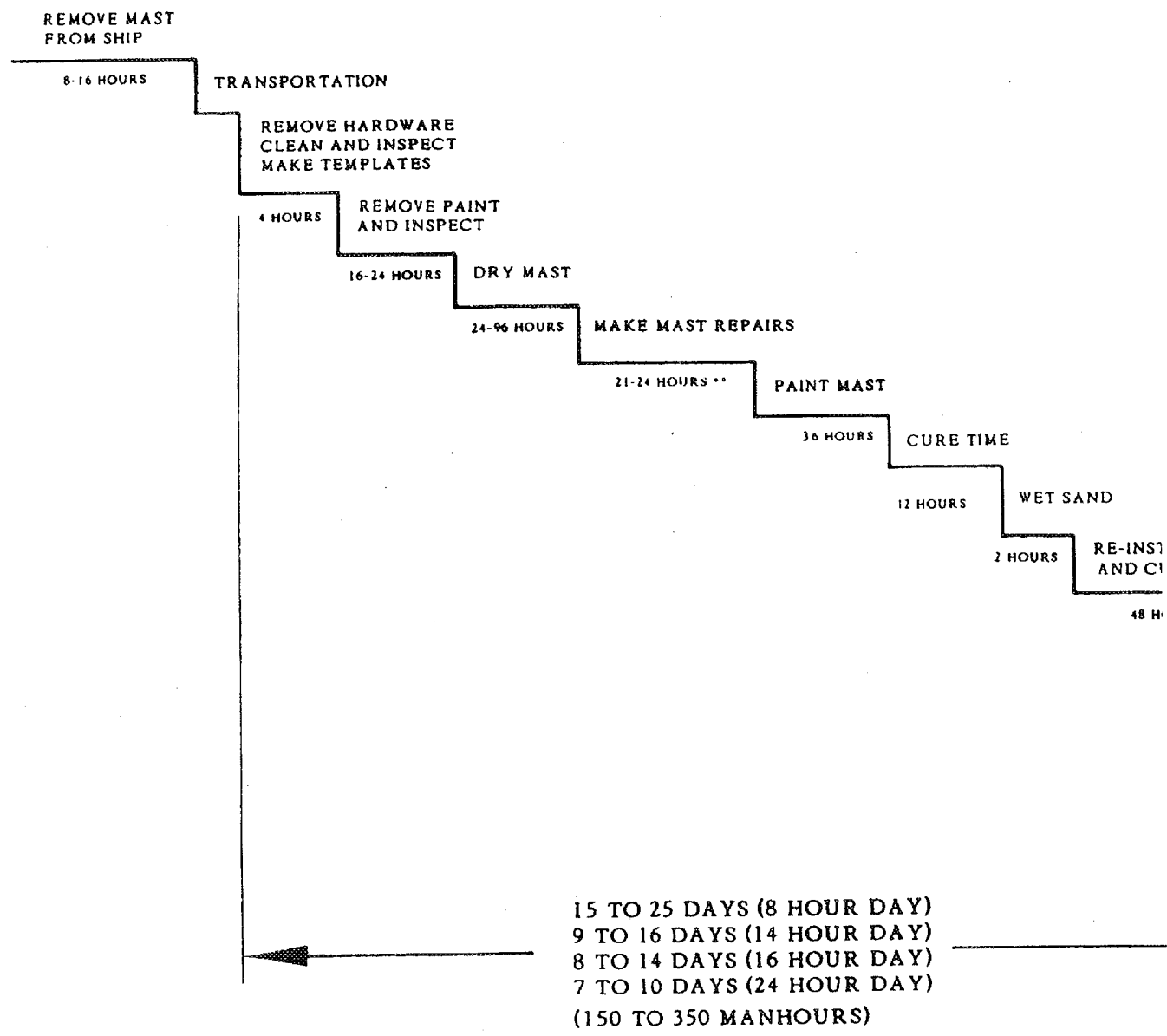
11-1.2 Table 11-1 contains restoration planning time estimates for a mast undergoing a moderate repair. Repair and painting estimates are developed in Table 11-2. Repair estimates will vary depending on the number and size of repairs. Painting times must conform with the estimates in Table 11-2, with the exception of sanding time.

11-1.3 Use Table 11-1 as a guide to develop reasonable planning estimates for the complete mast restoration process. Do not attempt to refurbish a mast if availability is less than the estimated time in Table 11-1. Repair minor defects only until a suitable time period is provided.

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11-2

TABLE 11-1 MAST RESTORATION PLANNING TIME ESTIMATE



* WATERLOGGED MAST DRYING TIMES OF UP TO 3 WEEKS HAVE BEEN ENCOUNTERED
** PLUS 7 HOURS PER LAYER OF FIBERGLASS
*** 8 HOURS PER PAIR OF BEARING SHOES

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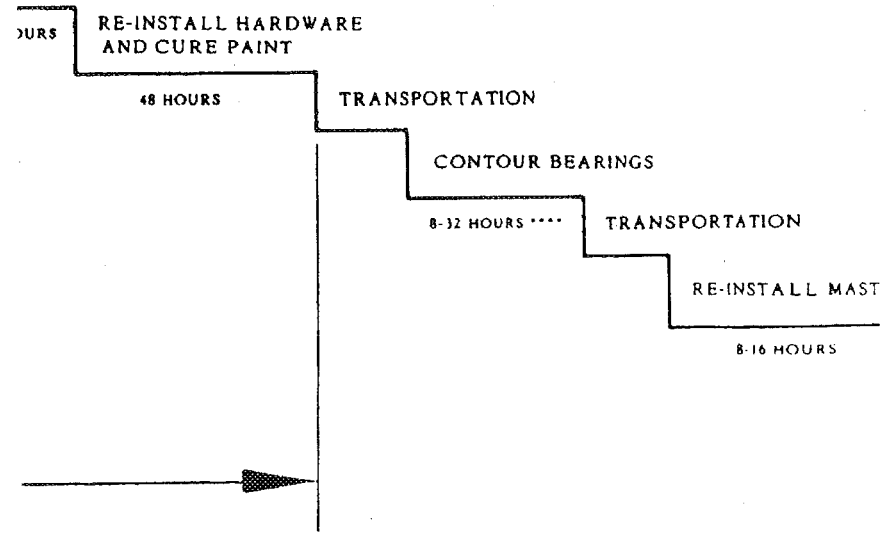
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TIME ESTIMATES

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TABLE 11-2 REPAIR AND PAINTING TIME ESTIMA

* REPAIR TIME ESTIMATES (each repair)

SEALER APPLICATION	10	PRIMER COAT (INCLUDES PRESCRIBED WAITING PERIOD)
SEALER SMOOTHING/ SANDING	5-7	
LAYING FIBERGLASS (each layer)	7	INITIAL SANDING
CHORD MEASUREMENT	1	PAINTING
CONTOUR ADJUSTMENT	3-4	THREE MEDIUM COATS @ EIGHT HOURS PER COAT (INCLUDES PRESCRIBED WAITING PERIOD)
FINAL SANDING	2	
TOTAL	<u>21-24 HOURS</u>	DRYING TIME (70°F)
(+ 7 HOURS PER LAYER)		FINAL SANDING
		FINAL CURING TIME
		FINAL SANDING
		TOTAL

11-3/(11-4 blank)

*BASED ON MODERATE REPAIR TO ONE BEARING SURFACE

+

+

ME ESTIMATES

FAIRED MAST PAINTING ESTIMATES

STANDARDACCELERATED

ES

8

8

2

2

24

24

@
T
D

12

4

2

N/A

48 (70°F)

24 (120-160)

N/A2

96 HOURS

64 HOURS

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